CLAIMS

1. An optical information recording medium, comprising one or more information layers including recording layers, respectively, each recording layer containing a material that can exhibit transition between two optically different states in response to irradiation with a laser beam as a main component,

wherein, in at least one of the recording layers, one of the two states of said material is an amorphous state,

wherein said material has an energy gap ranging from 0.9 eV to 2.0 eV in the amorphous state,

wherein the information layer including the recording layer that contains said material as a main component thereof has a light transmittance of not less than 30 % when irradiated with a laser beam having a wavelength ranging from 300 nm to 450 nm.

2. The optical information recording medium according to claim 1, wherein, in at least two of the information layers, the recording layers exhibit transition between two optically different states in response to irradiation with a laser beam that is incident on said material of the recording layers from a same direction.

3. The optical information recording medium according to claim 2,

wherein in at least one of the information layer closest to an incident side of the laser beam, said material as the main component of the recording layer of said information layer has an energy gap ranging from 0.9 eV to 2.0 eV in the amorphous state, and

said information layer has a light transmittance of not less than 30 % when irradiated with a laser beam having a wavelength ranging from 300 nm to 450 nm.

4. The optical information recording medium according to claim 1, wherein said recording layer has a thickness ranging from 1 nm to 25 nm.

5. The optical information recording medium according to claim 1, wherein at least one of the recording layers contains a material that can

exhibit a reversible transition between a crystalline state and an amorphous state as a main component.

6. The optical information recording medium according to claim 5, wherein the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state as a main component has a thickness ranging from 1 nm to 15 nm.

7. The optical information recording medium according to claim 5, wherein, as to the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state as a main component, a reflectance Rc of said recording layer with respect to the laser beam when said recording layer is in the crystalline state is higher than a reflectance Ra thereof with respect to the laser beam when said recording layer is in the amorphous state.

8. The optical information recording medium according to claim 5, wherein, as to the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state as a main component, a light absorptance Ac of said recording layer with respect to the laser beam when the recording layer is in the crystalline state is greater than 80 % of a light absorptance Aa thereof when said recording layer is in the amorphous state.

9. The optical information recording medium according to claim 5, wherein the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state as a main component satisfies a relationship expressed as:

$na > 2.5$;

$nc > 2.5$; and

$ka < 2.0$

where nc represents a refractive index of said material in the crystalline state, na represents a refractive index of said material in the amorphous state, and ka represents an extinction coefficient of said material in the amorphous state.

10. An optical information recording medium according to claim 9,

wherein the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state as a main component satisfies a relationship expressed as:

$$|kc - ka| \geq 0.5$$

where kc represents an extinction coefficient of said material in the crystalline state.

11. The optical information recording medium according to claim 9, wherein the na and nc satisfy a relationship expressed as:

$$na - nc \leq 1.0$$

12. The optical information recording medium according to claim 5, wherein the recording layer containing the material that can exhibit a reversible transition between the crystalline state and the amorphous state , as a main component satisfies a relationship expressed as:

$$E_0(c) \leq E_0(a) - 0.15$$

where $E_0(c)$ represents an energy gap of said material in the crystalline state, and $E_0(a)$ represents an energy gap of said material in the amorphous state.

13. The optical information recording medium according to claim 1, wherein said recording layer contains Se, and a content of Se in said recording layer is not less than 20 at% and not more than 60 at%.

14. The optical information recording medium according to claim 1,

wherein said recording layer contains Te and X, X representing at least one element selected from the group consisting of In, Al, Ga, Zn, and Mn,

wherein a content of Te in said recording layer is between 20 at% and 60 at%, and

a content of X therein is between 20 at% and 50 at%.

15. The optical information recording medium according to claim 13 or 14,

wherein said recording layer further contains at least one element selected from the group consisting of Al, Ga, In, Si, Ge, Sn, Sb, Bi, Sc, Ti, Nb, Cr, Mo Co, Cu, Ag, Au, Pd, N, and O.

16. The optical information recording medium according to claim 5, wherein the information layer including said recording layer has a crystallization promoting layer that is provided on at least one side of said recording layer so as to be in contact with a surface of said recording layer on the side.

17. The optical information recording medium according to claim 16, wherein the crystallization promoting layer contains N.

18. A method for recording, reproducing, or erasing information for use with the optical information recording medium according to claim 1, comprising:

irradiating said material as the main component of the recording layer in the medium with a laser beam converged to a microspot by an optical system so as to cause the material to shift to an optically different state,

wherein the laser beam used for recording the information is set so as to have a wavelength ranging from 300 nm to 450 nm.

19. An optical information recording/reproducing system, comprising the optical information recording medium according to claim 1, and a laser beam source that generates a laser beam for irradiating the optical information recording medium, wherein the laser beam has a wavelength ranging from 300 nm to 450 nm.